

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
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in its capacity as elected Office

Date of mailing (day/month/year) 30 August 2000 (30.08.00)	
International application No. PCT/KR99/00687	Applicant's or agent's file reference OPP990727KR
International filing date (day/month/year) 16 November 1999 (16.11.99)	Priority date (day/month/year) 16 November 1998 (16.11.98)
Applicant CHOI, Ki-Seung et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
13 June 2000 (13.06.00)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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Authorized officer

Juan Cruz

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## **BIOCIDE COMPOSITION AND STERILIZATION METHOD USING THE SAME**

This application is based on application No. 98-49095 filed in the Korean Industrial Property Office on November 16, 1998, the contents of which are  
5 incorporated hereinto by reference.

### **BACKGROUND OF THE INVENTION**

#### **(a) Field of the Invention**

The present invention relates to a biocide composition, more particularly to a biocide composition having synergistic effects by comprising 3-isothiazolone  
10 and polyhexamethyleneguanidine phosphate and a method for sterilizing microorganisms, fungi, etc. using the same.

#### **(b) Description of the Related Art**

Microorganisms, bacteria, mold, algae, etc. grow in industrial water such  
15 as cooling water, wastewater, emulsifiers used in the textile industry, etc. and have a deteriorating effective on the operations of industrial processes. Such microorganisms propagate using organisms contained in the industrial water as a nutrient source and secrete polysaccharides. Varieties of organic and inorganic substances combined with these secreted polysaccharides and form  
20 viscous lumps or masses also called slime. Organic materials such as cellulose, hemicellulose, and the fibrin of white water in paper industry in particular provide to have sufficient nutrient sources for such microorganisms. The slime formed at areas of low fluid flow in a paper processing process results in both direct and indirect losses, such as manufacturing time loss, equipment  
25 efficiency deterioration, etc. due to the deterioration of pulp quality, etc. Furthermore, the growth of microorganisms at such places like a cooling water facility, where much water is contained or recirculated causes a fouling phenomena. This deteriorates heat transfer efficiency in an industrial cooling tower, as well as corrodes metal or erodes wooden parts..

30 Bacteria such as taloblastic prokaryotes can propagate by decomposing

various types of organisms, some of which are the sources of the microbologically induced corrosion, by secreting and discharging polysaccharides forming a biofilm. Fungi such as eukaryote can also propagate by decomposing various types of organisms like bacteria, and some types of fungi secreting cellulase are the sources for discoloration and decomposition of wooden parts by way of degrading the fibroid materials of wooden parts of a cooling tower, etc.

Algae, such as eukaryote, can propagate by photosynthesizing under an environment with light, air, and a small amount of organisms, and carbohydrate formed from algae is used as a nutrient source for other microorganisms such as bacteria and fungi, thereby accelerating the fouling phenomena. Algal fouling due to algae propagation is intensified at places that are exposed to sunlight, particularly in cooling water facilities, swimming pools, etc. This phenomena results in clogging which blocks water pipes, as well as the deterioration of heat transfer efficiency, oxidization of metal surfaces by the generation of oxygen, and the promotion of corrosion at a holes on metallic surfaces through a partial galvanic reaction when the organism dies.

Various biocides are being developed in order to kill such microorganisms, fungi, algae, etc. or to prevent their surface adhesion to metal, etc. These biocides are generally divided into oxidant biocides and non-oxidant biocides. The oxidant biocides that are mainly used are halogen compounds such as chlorine, bromine, etc. that are popular due to their economic advantage of strong oxidation capability and low price. However, they can cause erosion of the wooden parts of cooling towers and metallic decomposition, and their sterilizing efficiency tends to deteriorate as they can be easily being discharged into atmosphere. Furthermore, their practical effectiveness is poor due their peculiar way of first reacting with secreted polysaccharides before they react with microorganisms that are the actual sources of biofilm formation.

Non-oxidant biocides which overcome these disadvantages include 3-isothiazolone, quaternary ammonium salt, formaldehyde emission compound, glutaraldehyde, etc. and are mainly used separately. Although 3-isothiazolone, which is disclosed in United States Patent Nos. 3,761,488, 4,105,431, 4,279,762, etc., has a high sterilizing effect and wide antibiotic spectrum, it has a

disadvantage in that its immediate instantaneous sterilizing effects are low. Furthermore, Korean Patent Application No. 89-20381 discloses an antiseptic composition useful in preventing circulation water putrefaction wherein a biocides 5-chloro-2-methyl-4-isothiazolone-3-on and 2-methyl-4-isothiazolone-3-on are mixed in a ratio of about 3:1 and wherein this antiseptic composition further comprises didecyldimethylammoniumchloride. United States Patent No. 4,379,137 discloses a method for improving sterilizing capability by mixing polymer quaternary ammonium salt and 3-isothiazolone. However, since these mixtures emit corrosive materials, i.e., halogen compounds such as fluorine, chlorine, etc., it is difficult for them to be applied where metals susceptible to corrosion are used, such as carbon steel, cast iron, stainless steel, copper, etc.

Additionally, Korean Patent Application No. 97-80170 discloses a process that can be applied even when metals susceptible to corrosion are used since the disclosed process does not emit a halogen compound. Another water soluble biocide composition having synergistic effects comprising 3-isothiazolone, which has high sterilizing effect on quaternary ammonium phosphate and microorganisms, is disclosed in Korean Patent Application No. 97-46517 as a biocide having superior properties of immediate sterilizing effects on microorganisms, durability, anticorrosiveness, etc. However, there is a problem in applying this invention to various industrial fields due to the issues such as bubbling or foaming, etc. when quaternary ammonium is added to provide immediate effectiveness to the 3-isothiazolone.

Furthermore, while polyhexamethyleneguanidine phosphate has immediate effectiveness, and is used in the effective and wide control of microorganisms in various industrial fields, including water treatment, as well as exhibiting low foaming properties, it has a disadvantage of not having a wide antibiotic spectrum by itself.

### **SUMMARY OF THE INVENTION**

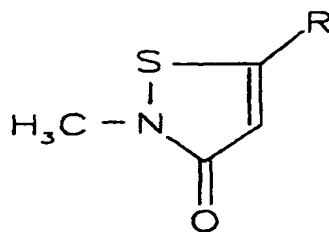
It is an object of the present invention to provide a biocide composition which can be used in the process where metals susceptible to corrosion are used, such as carbon steel, cast iron, stainless steel, copper, etc., as well as which has high sterilizing capability, a wide antibiotic spectrum, and superior

antiseptic effects.

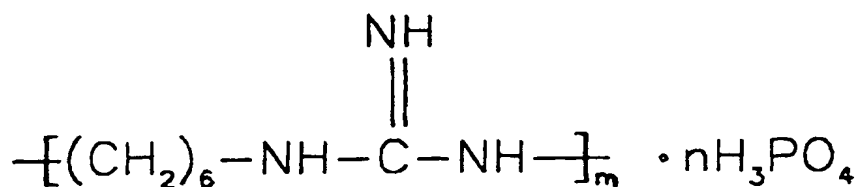
It is an other object of the present invention to provide a biocide composition which can not only be applied to various industrial processes on account of its low foaming features, but also which has a high sterilizing capability even when a small amount is used.

The present invention provides a biocide composition comprising 3-isothiazolone of the following General Formula 1 and polyhexamethyleneguanidine phosphate of the following General Formula 2 in order to accomplish the above objects:

[General Formula 1]



[General Formula 2]



15

where R is hydrogen or chlorine in the above General Formula 1 in the above General Formula 1, m is integer from 4 to 7, and n is an integer from 1 to 14 in the above General Formula 2. The present invention further provides a sterilizing method which kills or restrains the growth of bacteria, fungi or algae by inputting the above biocide composition into a media that is contaminated by

bacteria, fungi, and algae.

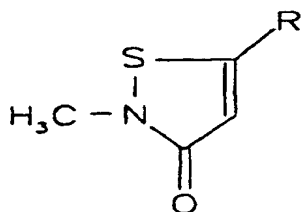
### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following detailed description, only the preferred embodiments of the invention have been shown and described, simply by way of illustration of the best mode contemplated by the inventor(s) of carrying out the invention. As will be realized, the invention is capable of modification in various obvious respects, all without departing from the invention. Accordingly, the description is to be regarded as illustrative in nature, and not restrictive.

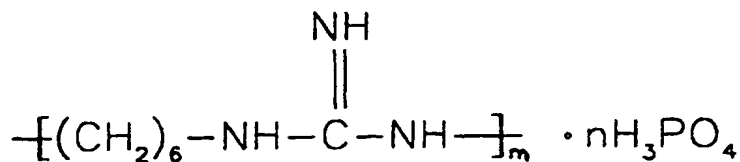
The present invention is described in detail below.

The present invention provides an antiseptic and/or biocide composition comprising 3-isothiazolone of the below General Formula 1 and polyhexamethyleneguanidine phosphate of the below General Formula 2:

[General Formula 1]



[General Formula 2]



where R is hydrogen or chlorine in the above General Formula 1 in the above General Formula 1, m is integer from 4 to 7, and n is an integer from 1 to 14 in the above General Formula 2.

In the above General Formulae, 3-isothiazolone is preferably 2-methyl-4-isothiazolone-3-one having R group of hydrogen or 5-chloro-2-methyl-4-

isothiazolone-3-on having R group of chlorine, and more preferably a mixture in which 2-methyl-4-isothiazolone-3-on and 5-chloro-2-methyl-4-isothiazolone-3-on are mixed in a weight ratio of 1:20 to 20:1. If the above ratio of 3-isothiazolone compound is out of the range of 1:20 to 20:1, the sterilizing effects are  
5 deteriorated.

The mixing ratio of the above 3-isothiazolone and polyhexamethyleneguanidine phosphate is preferably a weight ratio of 1:1 to 1:65, more preferably 1:1 to 1:4. If the above mixing ratio of 3-isothiazolone and polyhexamethyleneguanidine phosphate is out of the above range, the  
10 synergistic effects by the mixture of two biocides are deteriorated or not seen.

If the present invention of a mixture of 3-isothiazolone and polyhexamethyleneguanidine phosphate are used as a biocide composition, 3-isothiazolone compensates for the disadvantage in the low sterilizing effects of polyhexamethyleneguanidine phosphate on fungi and some bacteria, while  
15 polyhexamethyleneguanidine phosphate compensates for the disadvantage of 3-isothiazolone has in its low initial and immediate sterilizing capability and effectiveness. Synergistic effects are seen in that the sterilizing action of a mixed biocide becomes greater than the sum of the sterilizing action that each component compound has. That is, the present invention of a composition can  
20 restrain microorganisms more widely and effectively by mixing the two types of compounds having different sterilizing mechanisms, and obtains further effects such as the lowering of an emergence frequency of resistant strains more than in the case of using a single component compound.

A biocide composition of the present invention is preferably used in an  
25 aqueous solution and more preferably used by putting 5 to 1,000 parts per million (ppm) of it into cooling water, etc. in which the microorganisms exist, although the amount used has no limit as long as it achieves the targetted sterilizing effects. A biocide composition of the present invention can be used in controlling microorganisms widely and effectively in the various industrial  
30 fields such as in pulp and paper plants, cooling towers, as a disinfectant, etc.. In particular, it can be used by adding it to the cooling water of an industrial process, to disinfectant, paint, latex antiseptic, cosmetic additives, additives for emulsion products such as shampoo, etc., slime control chemicals for textile



weaving, paper slime control agent, and antiseptics for leather goods, metal processing oil, etc.

COMPARATIVE EXAMPLES for helping in gaining in an understanding  
5 of the present invention and preferable EXAMPLES are described below.

[EXAMPLES 1-6]

The sterilizing effects of 3-isothiazolone and polyhexamethyleneguanidine phosphate on a mixed solution of 8 types of  
10 bacteria (Enterobacter aerogens ATCC 13048, Escherichia coli ATCC 11229, Micrococcus luteus ATCC 9341, Pseudomonas aeruginosa ATCC 15442, Klebsiella pneumoniae ATCC 1560, Staphylococcus epidermis ATCC 155, Staphylococcus aureus ATCC 6538, and Bacillus subtilis ATCC 6984) were tested using Tryptic Soy Broth manufactured by Difco Corporation according to  
15 the two fold dilution method. The minimum inhibiting concentration of each biocide and mixtures thereof were determined by observation with the naked eye of the degree of muddiness of the lowest concentration in which growth was deteriorated after culturing a culture fluid in which biocides and microorganisms are added at 30 degrees centigrade for 3 days.

20 It was determined that a synergistic effect of a biocide was seen when the sum of QA/Qa and QB/Qb was less than 1, as in the following EQUATION according to the method published in the paper of Kull, F. C. et al (Appl. Microbiol. 9:53 8~544 (1961)), and these results are represented in Table 1:

$$\text{Synergistic Index (SI)} = (QA/Qa) + (QB/Qb)$$

25 where Qa and Qb are MIC values (ppm) of a single compound A and single compound B, respectively, and QA and QB are MIC values (ppm) of the compounds A and B, respectively, out of each mixture.

[Table 1]

	Qa	Qb	QA	QB	QA/Qa	QB/Qb	SI
EXAMPLE 1	18.8	312.5	9.4	9.8	0.5	0.03	0.53
EXAMPLE 2	18.8	312.5	9.4	19.5	0.5	0.06	0.56
EXAMPLE 3	18.8	312.5	9.4	39.1	0.5	0.13	0.63

EXAMPLE 4	18.8	312.5	9.4	78.1	0.5	0.25	0.75
EXAMPLE 5	18.8	312.5	9.4	156.3	0.5	0.50	1.0
EXAMPLE 6	18.8	312.5	2.4	156.3	0.13	0.50	0.63

Qa : MIC value (ppm) on the mixed strain of a single 3-isothiazolone;

Qb : MIC value (ppm) on the mixed strain of a single poly-hexamethyleneguanidine phosphate;

5 QA : MIC value (ppm) of 3-isothiazolone out of a mixture;

QB : MIC value (ppm) of polyhexamethyleneguanidine out of a mixture.

As represented in the above Table 1, it can be seen that the same microorganism killing effect (SI was 0.53 in EXAMPLE 1) can be obtained even though only a half amount of 3-isothiazolone is used and the amount of polyhexamethyleneguanidine phosphate used is reduced to 9.8 ppm. The same microorganism killing effect (SI was 0.63 in EXAMPLE 6) can also be obtained even though only a half amount of polyhexamethyleneguanidine phosphate is used and only 2.4 ppm of 3-isothiazolone is used. Therefore, it can be shown that a mixture of the above two compounds can inhibit the growth of bacteria more effectively than the single use of each of the two compounds, and the synergistic action ratio of 3-isothiazolone and polyhexamethyleneguanidine phosphate is most preferable in the range of 1:1 to 1:4, where SI is from 0.53 to 0.63.

#### [TEST EXAMPLE 1 AND COMPARATIVE EXAMPLE 1]

20 The minimum inhibition concentration (MIC) values of a biocide composition in which 3-isothiazolone and polyhexamethyleneguanidine phosphate are mixed in a ratio of 1:4 (1 wt% of 3-isothiazolone and 15 wt% of 25 wt% poly-hexamethyleneguanidine phosphate) and of a single biocide of 1.5 wt% 3-isothiazolone were measured on 7 types of individual strains. After diluting a biocide using 96 multi wall plates according to the two fold continuous dilution method, microorganisms were inoculated at a concentration of 104 CFU/ml. Then, after culturing at 30 degrees centigrade for 48 hours, the MIC values were measured by observation with the naked eye of the growth of microorganisms on the basis of muddiness. The results are represented in

Table 2.

The muddiness was observed using Tryptic Soy Broth manufactured by Difco Corporation as a medium in order to measure MIC values and strains of *Enterobacter aerogens* ATCC 13048, *Staphylococcus aureus* ATCC 6538, *Staphylococcus epidermis* ATCC 155, *Bacillus subtilis* ATCC 6984, *Saccharomyces cerevisiae* ATCC 9763, *Rhizopus oryzae* ATCC 10404, *Aspergillus niger* ATCC 9642 were used from among the strains which were used in EXAMPLE 1.

10 [Table 2]

MIC test results on microorganisms of a biocide mixture and a single biocide of 1.5 wt% 3-isothiazolone (units: ppm):

Strains Used	COMPARATIVE EXAMPLE (1.5% isothiazolone)	TEST EXAMPLE (Biocide mixture)
<i>Enterobacter aerogens</i> ATCC 13048	390	195
<i>Staphylococcus aureus</i> ATCC 6538	195	195
<i>Staphylococcus epidermis</i> ATCC 155	390	97
<i>Bacillus subtilis</i> ATCC 6984	390	195
<i>Saccharomyces cerevisiae</i> ATCC 9763	390	390
<i>Rhizopus oryzae</i> ATCC 10404	390	195
<i>Aspergillus niger</i> ATCC 9642	195	195

As can be shown from the above Table 2, a biocide mixture in which 3-isothiazolone and 25 wt% polyhexamethyleneguanidine phosphate are mixed using the synergistic index is much more effective in controlling microorganisms than is a biocide with a single component of 1.5 wt% 3-isothiazolone.

#### [TEST EXAMPLE 2 AND COMPARATIVE EXAMPLE 2]

20 In order to determine the killing time to kill microorganisms when the biocide mixture used in TEST EXAMPLE 1 and 1.5% 3-isothiazolone that was used in COMPARATIVE EXAMPLE 1, measurements were made of the immediate effectiveness, the durability, and the number of strains by taking a strain solution at times corresponding to 0 hours, 3 hours, 24 hours, 48 hours, 72 hours, and 96 hours after respectively putting in 50, 100, and 200 ppm of a biocide mixture and 1.5% 3-isothiazolone into the cooling water of a polymerization cooling tower having a microorganism concentration of about 104

CFU/ml., A solution in which a biocide was not added was used as a blank. The measured results on the strain reduction ratios according to the time when the biocide mixture in which 3-isothiazolone and polyhexamethyleneguanidine phosphate was mixed are presented using a synergistic index, as well as data for single component biocide of 1.5 wt% 3-isothiazolone, are represented in Table 3 and Table 4.

[Table 3]

Measured results on the reduction ratio of microorganisms according to the concentration of a biocide mixture verses time (units: CFU/ml):

		0	3 hours	24 hours	48 hours	72 hours	96 hours
Blank		13,000	> 13,000	> 13,000	> 13,000	> 13,000	> 13,000
Biocide mixture	50 ppm	13,000	210	140	90	40	50
	100 ppm	13,000	80	170	90	50	30
	200 ppm	13,000	50	90	50	40	50

[Table 4]

Measured results on the reduction ratio of microorganisms according to the concentration verses time of 1.5 wt% of 3-isothiazolone (units: CFU/ml):

		0	3 hours	24 hours	48 hours	72 hours	96 hours
Blank		13,000	> 13,000	> 13,000	> 13,000	> 13,000	> 13,000
1.5 wt% of isothiazolone	50 ppm	13,000	12,000	450	> 10,000	> 10,000	> 10,000
	100 ppm	13,000	11,400	370	6,250	> 10,000	> 10,000
	200 ppm	13,000	5,300	200	2,100	> 10,000	> 10,000

As can be shown in the above Table 3 and Table 4, the single compound 1.5 wt% of 3-isothiazolone biocide shows sterilizing capability after 24 hours, while the immediate effectiveness is low and there is also a secondary propagation of microorganisms after 48 hours. The biocide mixture of 3-isothiazolone and polyhexamethyleneguanidine phosphate achieves synergistic effects as seen in immediate effectiveness, durability, and superior sterilizing effects on microorganisms as compared to the single component biocide. Therefore, it can be shown that when 3-isothiazolone and polyhexamethyleneguanidine phosphate are mixed, the disadvantage of 3-isothiazolone with immediate effectiveness and the problems of

polyhexamethyleneguanidine phosphate associated with antibiotic spectrum are mutually compensated, and sterilizing capability is correlated with a synergistic effect index.

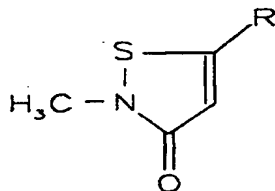
As described in the above, a biocide composition of the present invention can be effectively used in the wide control of microorganisms in various industrial fields such as water treatment, disinfectants, etc., since it has immediate effectiveness and durability, as well as applicability to a wide antibiotic spectrum. Furthermore, a biocide composition of the present invention can effectively control industrial water microorganism contamination and the actual living environment of the microorganisms since it is more effective in controlling the microorganisms and has greater immediate sterilizing capability than does a single compound biocide. A biocide composition of the present invention has an effect to lower the emergence frequency of a resistant strain as compared a single compound biocide, achieving this using a mixture of biocides having the different working mechanism.

While the present invention has been described in detail with reference to the preferred embodiments, those skilled in the art will appreciate that various modifications and substitutions can be made thereto without departing from the spirit and scope of the present invention as set forth in the appended claims.

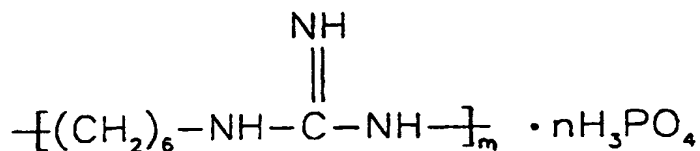
**WHAT IS CLAIMED IS:**

A biocide composition comprising 3-isothiazolone of the following General Formula 1 and polyhexamethyleneguanidine phosphate of the following General Formula 2:

5 [General Formula 1]



[General Formula 2]



10 where R is hydrogen or chlorine in the above General Formula 1, m is an integer from 4 to 7 and n is an integer from 1 to 14 in the above General Formula 2.

2. A biocide composition in accordance with claim 1 wherein, the mixing ratio of the above 3-isothiazolone and polyhexamethyleneguanidine phosphate  
15 is a weight ratio of 1:1 to 1:65.

3. A biocide composition in accordance with claim 1 wherein, the above 3-isothiazolone is a mixture in which 3-isothiazolone having R of hydrogen and 3-isothiazolone having R of chlorine are mixed in a weight ratio of 1:20 to 20:1 and the mixing ratio of the above 3-isothiazolone and  
20 polyhexamethyleneguanidine phosphate is from 1:1 to 1:4.

4. A biocide composition in accordance with claim 1 characterized in that before the use of the above biocide composition, it is mixed with a media selected from the group consisting of cooling water of an industrial process, disinfectant, paint, antiseptic for latex, additives for cosmetics, additives for  
25 emulsion products, slime control chemicals for textile weaving, paper slime

control agent, antiseptic for leather goods, and antiseptic for metal processing oil.

5. A sterilizing method of killing or restraining the growth of bacteria, fungi and/or algae by putting a biocide composition of claim 1 into the area that is contaminated by bacteria, fungi and/or algae.

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR99/00687

## A. CLASSIFICATION OF SUBJECT MATTER

IPC<sup>7</sup>: A 01 N 43/80, 47/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>7</sup>: A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI ON EPOQUE, week199836, London: Derwent Publications Ltd., AN 1998-422258, class A97, JP 10175809 A (NAGASE KASEI KOGYO KK), abstract.</p> <p>----</p>	1-5

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

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„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&“ document member of the same patent family

Date of the actual completion of the international search

1 February 2000 (01.02.00)

Date of mailing of the international search report

29 March 2000 (29.03.00)

Name and mailing adress of the ISA/AT

Austrian Patent Office

Kohlmarkt 8-10; A-1014 Vienna

Facsimile No. 1/53424/535

Authorized officer

SCHNASS

Telephone No. 1/53424/217



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR 99/00687

Patent document cited  
in search report

Publication  
date

Patent family  
member(s)

Publication  
date

JP	A2	10175809	30-06-1998	none
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# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) OPP990727KR

**Box No. I TITLE OF INVENTION** BIOCIDIC COMPOSITION AND STERILIZATION METHOD  
USING THE SAME

**Box No. II APPLICANT**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

SK CHEMICALS

600, Jungja 1-dong, Changan-ku, Suwon-city  
Kyungki-do, 440-301 Republic of Korea

☐ This person is also inventor.

Telephone No.  
0331-240-8558

Facsimile No.  
0331-245-1192

Teleprinter No.

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CHOI, Ki-Seung

Jindalrae Apt. 103-302, Ojeon-dong 21  
Uiwang-city, Kyungki-do, 437-070  
Republic of Korea

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

KIM, Won-Ho

702, Teheran Bldg., 825-33  
Yoksam-dong, Kangnam-ku  
Seoul, 135-080 Republic of Korea

Telephone No.  
02-3458-0700

Facsimile No.  
02-553-5254

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

KIM, Jin-Man

Cheonrok Apt. 3-306, Yuljeon-dong, Changan-ku

Suwon-city, Kyungki-do, 440-320

Republic of Korea

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

PARK, Jeong-Ho

Dongshin Apt. 201-1109, Jungja 1-dong, Changan-ku

Suwon-city, Kyungki-do, 440-301

Republic of Korea

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CHO, Myung-Ho

Samsung Apt. 1-805, Kwonseon-dong

Kwonseon-ku, Suwon-city, Kyungki-do, 441-390

Republic of Korea

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

HAHN, Soon-Jong

Kwanak-Hyundai Apt. 123-1402, Bongcheon 3-dong

Kwanak-ku, Seoul, 151-053

Republic of Korea

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality: KR

State (that is, country) of residence: KR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

## Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(u) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☐ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |   |   |
|---|---|
| <input type="checkbox"/> AL Albania .....                               | <input type="checkbox"/> LS Lesotho .....                                   |
| <input type="checkbox"/> AM Armenia .....                               | <input type="checkbox"/> LT Lithuania .....                                 |
| <input type="checkbox"/> AT Austria .....                               | <input type="checkbox"/> LU Luxembourg .....                                |
| <input checked="" type="checkbox"/> AU Australia .....                  | <input type="checkbox"/> LV Latvia .....                                    |
| <input type="checkbox"/> AZ Azerbaijan .....                            | <input type="checkbox"/> MD Republic of Moldova .....                       |
| <input type="checkbox"/> BA Bosnia and Herzegovina .....                | <input type="checkbox"/> MG Madagascar .....                                |
| <input type="checkbox"/> BE Barbados .....                              | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia ..... |
| <input type="checkbox"/> BG Bulgaria .....                              | <input type="checkbox"/> MN Mongolia .....                                  |
| <input type="checkbox"/> BR Brazil .....                                | <input type="checkbox"/> MW Malawi .....                                    |
| <input type="checkbox"/> BY Belarus .....                               | <input type="checkbox"/> MX Mexico .....                                    |
| <input checked="" type="checkbox"/> CA Canada .....                     | <input type="checkbox"/> NO Norway .....                                    |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein .....  | <input type="checkbox"/> NZ New Zealand .....                               |
| <input checked="" type="checkbox"/> CN China .....                      | <input type="checkbox"/> PL Poland .....                                    |
| <input type="checkbox"/> CU Cuba .....                                  | <input type="checkbox"/> PT Portugal .....                                  |
| <input type="checkbox"/> CZ Czech Republic .....                        | <input type="checkbox"/> RO Romania .....                                   |
| <input type="checkbox"/> DE Germany .....                               | <input type="checkbox"/> RU Russian Federation .....                        |
| <input type="checkbox"/> DK Denmark .....                               | <input type="checkbox"/> SD Sudan .....                                     |
| <input type="checkbox"/> EE Estonia .....                               | <input type="checkbox"/> SE Sweden .....                                    |
| <input type="checkbox"/> ES Spain .....                                 | <input type="checkbox"/> SG Singapore .....                                 |
| <input type="checkbox"/> FI Finland .....                               | <input type="checkbox"/> SI Slovenia .....                                  |
| <input type="checkbox"/> GB United Kingdom .....                        | <input type="checkbox"/> SK Slovakia .....                                  |
| <input type="checkbox"/> GD Grenada .....                               | <input type="checkbox"/> SL Sierra Leone .....                              |
| <input type="checkbox"/> GE Georgia .....                               | <input type="checkbox"/> TJ Tajikistan .....                                |
| <input type="checkbox"/> GH Ghana .....                                 | <input type="checkbox"/> TM Turkmenistan .....                              |
| <input type="checkbox"/> GM Gambia .....                                | <input type="checkbox"/> TR Turkey .....                                    |
| <input type="checkbox"/> HR Croatia .....                               | <input type="checkbox"/> TT Trinidad and Tobago .....                       |
| <input type="checkbox"/> HU Hungary .....                               | <input type="checkbox"/> UA Ukraine .....                                   |
| <input type="checkbox"/> ID Indonesia .....                             | <input type="checkbox"/> UG Uganda .....                                    |
| <input type="checkbox"/> IL Israel .....                                | <input checked="" type="checkbox"/> US United States of America .....       |
| <input type="checkbox"/> IN India .....                                 | <input type="checkbox"/> UZ Uzbekistan .....                                |
| <input type="checkbox"/> IS Iceland .....                               | <input type="checkbox"/> VN Viet Nam .....                                  |
| <input checked="" type="checkbox"/> JP Japan .....                      | <input type="checkbox"/> YU Yugoslavia .....                                |
| <input type="checkbox"/> KE Kenya .....                                 | <input type="checkbox"/> ZW Zimbabwe .....                                  |
| <input type="checkbox"/> KG Kyrgyzstan .....                            |   |
| <input type="checkbox"/> KP Democratic People's Republic of Korea ..... |   |
| <input type="checkbox"/> KR Republic of Korea .....                     |   |
| <input type="checkbox"/> KZ Kazakhstan .....                            |   |
| <input type="checkbox"/> LC Saint Lucia .....                           |   |
| <input type="checkbox"/> LK Sri Lanka .....                             |   |
| <input type="checkbox"/> LR Liberia .....                               |   |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
- ☐ .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)


<b>Box No. VI PRIORITY CLAIM</b>					<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:			
		national application: country	regional application:* regional Office	international application: receiving Office	
item (1) 16 November, 1998 (16/11/1998)	98-49095	KR			
item (2)					
item (3)					

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>			
<b>Choice of International Searching Authority (ISA)</b> (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):  ISA / AT	<b>Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):</b>  Date (day/month/year)      Number      Country (or regional Office)		

<b>Box No. VIII CHECK LIST; LANGUAGE OF FILING</b>	
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 11 claims : 2 abstract : 1 drawings : sequence listing part of description : Total number of sheets : 18	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input checked="" type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):
Figure of the drawings which should accompany the abstract:	Language of filing of the international application: English

<b>Box No. IX SIGNATURE OF APPLICANT OR AGENT</b>	
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).	
KIM, Won-Ho	

For receiving Office use only	
1. Date of actual receipt of the purported international application:  3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:  4. Date of timely receipt of the required corrections under PCT Article 11(2):  5. International Searching Authority (if two or more are competent): ISA /	2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:  6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

# PCT

## FEE CALCULATION SHEET Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's  
file reference

OPP990727KR

Applicant

SK Chemicals, et al.

### CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE . . . . . W 45,000 T

2. SEARCH FEE . . . . . W 204,000 S

International search to be carried out by Austrian Patent Office  
(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

#### Basic Fee

The international application contains 18 sheets.

first 30 sheets . . . . . W 517,100 b1

\_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_ b2

remaining sheets additional amount

Add amounts entered at b1 and b2 and enter total at B . . . . . W 517,100 B

#### Designation Fees

The international application contains 6 designations.

6 x 119,300 = W 715,800 D

number of designation fees amount of designation fee payable (maximum 11)

Add amounts entered at B and D and enter total at I . . . . . W 1,232,900 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) . . . . . P

5. TOTAL FEES PAYABLE . . . . . W 1,481,900

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

### MODE OF PAYMENT

☐ authorization to charge  
deposit account (see below)

☐ bank draft

☐ coupons

☐ cheque

☒ cash

☐ other (specify):

☐ postal money order

☐ revenue stamps

### DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ \_\_\_\_\_ ☐ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

Deposit Account No.

Date (day/month/year)

Signature

## PATENT COOPERATION T TY

From the RECEIVING OFFICE

To:

KIM, Won Ho

702, Teheran Bldg., 825-33 Yoksam-dong, Kangnam-ku,  
Seoul 135-080, Republic of KOREA**PCT****NOTIFICATION OF THE INTERNATIONAL  
APPLICATION NUMBER AND OF THE  
INTERNATIONAL FILING DATE**

(PCT Rule 20.5(C))

Date of mailing  
(day/month/year) 19 NOVEMBER 1999 (19.11.1999)

Applicant's or agent's file reference

OPP990727KR

**IMPORTANT NOTIFICATION**

International application No.

PCT/KR99/00687

International filing date (day/month/year)

16 NOVEMBER 1999 (16.11.1999)

Priority date (day/month/year)

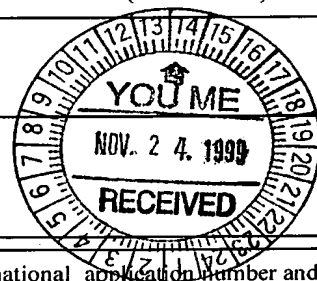
16 NOVEMBER 1998 (16.11.1998)

Applicant

SK CHEMICALS et al

Title of the invention

BIOCIDE COMPOSITION AND STERILIZATION METHOD USING THE SAME



1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

☐ was transmitted to the International Bureau on \_\_\_\_\_.

☒ has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau\*:

☒ because the necessary national security clearance has not yet been obtained.

☐ because (reason to be specified):

\* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

Name and mailing address of the receiving Office

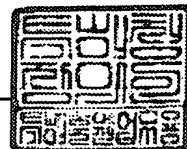
Korean Industrial Property Office  
Government Complex-Taejon, Dunsan-dong, So-ku, Taejon  
Metropolitan City 302-701, Republic of Korea

Authorized officer

COMMISSIONER

Facsimile No. 82-42-472-3466

Telephone No. 82-42-481-5213



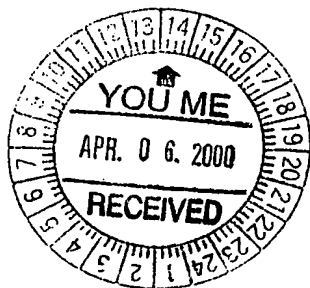
# TENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

To:

KIM, Won Ho  
702, Teheran Bd., 825-33,  
Yoksam-dong, Kangnam-ku  
Seoul 135-080  
Republic of Korea



### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference <b>OPP990727KR</b>	Date of mailing <i>(day/month/year)</i> <b>29 Mrz. 2000 (29.03.00)</b>
International application No. <b>PCT / KR 99/00687</b>	International filing date <i>(day/month/year)</i> <b>16 Nov. 1999 (16.11.99)</b>
Applicant <b>SK CHEMICALS et al.</b>	

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.
- Filing of amendments and statement under Article 19:**  
 The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):
- When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.
- Where?** Directly to the International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland  
 Facsimile No.: (41-22) 740.14.35
- For more detailed instructions, see the notes on the accompanying sheet.**
2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.  
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
4. **Further action(s):** The applicant is reminded of the following:
- Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.
- Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).
- Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/ <div style="text-align: center;">AT AUSTRIAN PATENT OFFICE Kohlmarkt 8-10 A-1014 Vienna</div> Facsimile No. <b>+43 / 1 / 534 24 - 200</b>	Authorized officer <div style="text-align: center;">Koch  +43 / 1 / 534 24 - 450</div> Telephone No.
---	---



## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

**When ?** Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

**How ?** Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments ?

**Better (Section 205(b)):**

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

## NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

### "Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

**It must be in the language in which the international application is to be published.**

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

### Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

### Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>OPP990727KR</b>	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. <b>PCT/KR 99/00687</b>	International filing date (day/month/year) <b>16 November 1999 (16.11.99)</b>	(Earliest) Priority Date (day/month/year) <b>16 November 1998 (16.11.98)</b>
Applicant <b>SK CHEMICALS et al.</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.: \_\_\_\_\_

☐ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR99/00687

## A. CLASSIFICATION OF SUBJECT MATTER

IPC<sup>7</sup>: A 01 N 43/80, 47/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>7</sup>: A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE WPI ON EPOQUE, week199836, London: Derwent Publications Ltd., AN 1998-422258, class A97, JP 10175809 A (NAGASE KASEI KOGYO KK), abstract. ----	1-5

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&amp;“ document member of the same patent family

Date of the actual completion of the international search

1 February 2000 (01.02.00)

Date of mailing of the international search report

29 March 2000 (29.03.00)

Name and mailing address of the ISA/AT

Austrian Patent Office

Kohlmarkt 8-10; A-1014 Vienna

Facsimile No. 1/53424/535

Authorized officer

SCHNASS

Telephone No. 1/53424/217

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/KR 99/00687

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
JP	A2	10175809	30-06-1998	none	

<b>NOTIFICATION OF CHANGE OF</b>	<input checked="" type="checkbox"/> <b>NAME(TITLE)</b> <input type="checkbox"/> <b>ADDRESS</b> <input type="checkbox"/> <b>COUNTRY OF NATIONALITY</b> <input type="checkbox"/> <b>SEAL IMPRESSION</b>	<b>OF</b>	<input checked="" type="checkbox"/> <b>APPLICANT</b> <input type="checkbox"/> <b>AGENT</b> <input type="checkbox"/> <b>COMMON REPRESENTATIVE</b> <input type="checkbox"/> <b>INVENTOR</b>
To : Commissioner of the Korean Industrial Property Office			
International Application No.		PCT/KR99/00687	
<b>Applicant</b>	Name	SK Chemicals et al.	
	Address	600, Jungja 1-dong, Changan-ku, Suwon-city, Kyungki-do, 440-301, Republic of Korea	
<b>Agent</b>	Name	KIM, Won-Ho	Agent's Code
	Address	702, Teheran Bldg., 825-33, Yoksam-dong, Kangnam-ku, Seoul 135-080, Republic of Korea	
<b>Contents of Notification</b>	Former	SK Chemicals et al.	
	New	SK Chemicals Co., Ltd., et al.	
<p style="text-align: center;">Submitted hereby is a notification pursuant to Article 81 of the Enforcement Regulations of the Patent Law.</p> <p style="text-align: center;">Date(day/month/year)</p> <p style="text-align: center;">09/05/2001</p> <p style="text-align: center;">Applicant (Agent)      KIM, Won-Ho      (Seal)</p>			
<p>※ Attached Document(s) :</p> <ol style="list-style-type: none"> <li>1. A copy of the document(s) substantiating the contents of notification</li> <li>2. A copy of the document(s) substantiating the power of attorney, if any</li> </ol>			